

**What is claimed is:**

1. A method for adventitious root mass propagation of ginseng, camphor ginseng and wild ginseng by tissue culture, which comprises the steps of:

Inducing the callus by seeding any one of the 2-3mm<sup>2</sup> sections of ginseng, camphor ginseng, wild ginseng in a MS media containing 1.0-10.0mg/L of 2,4-D (2,4-dichlorophenoxy acetic acid), pochloram and NAA(naphthalemeacetic acid);

Forming an adventitious root by transferring it to a MS (Murashige-Skoog) media containing 1.0-5.0mg/L of IBA or NAA, after subculturing the induced callus in every 2-4 weeks which was propagated on a MS media containing 0.1-5.0mg/L of 2,4-D;

Propagating the above adventitious root on MS media;

Seeding the propagated adventitious root in a buoyant balloon shape bioreactor and culturing it in a MS media containing 3% of sugar and 1.0-10.0 mg/L of BSSA (benzo [b] selenienyl acetic acid) or IBA or NAA as a growth regulator; and

Mass propagating the cultured adventitious root by scaling up with 20-50 ton of bioreactor.

2. The method for adventitious root mass propagation of ginseng, camphor ginseng and wild ginseng by tissue culture of claim 1, the method for the mass propagation of adventitious root of ginseng, camphor ginseng, wild ginseng by tissue culture under the conditions including the concentration of inorganic matter of 1/2-3/4, pH 5.7-6.0, sugar concentration of 3-5% and the

temperature of 18-24 °C.

3. The method for adventitious root mass propagation of ginseng, camphor ginseng and wild ginseng by tissue culture of claim 1, the method for the mass propagation of the adventitious root of ginseng, camphor ginseng, and wild ginseng by tissue culture including the seeding method of the propagated adventitious root to the bioreactor through seeding the cultured explants together with the newly formed lateral root sectioned randomly in a length of 1-2 cm.

4. The method for adventitious root mass propagation of ginseng, camphor ginseng and wild ginseng by tissue culture as claimed claim 1 or 3, the method for the mass propagation of the adventitious root of ginseng, camphor ginseng and wild ginseng by tissue culture including the culturing conditions of the adventitious root in the bioreactor including the temperature of 22 °C, the air injection rate of 0.05-0.3vvm and pH of 6.0.

5. The method for adventitious root mass propagation of ginseng, camphor ginseng and wild ginseng by tissue culture of claim 1, the method for the mass propagation of the adventitious root of ginseng, camphor ginseng and wild ginseng by tissue culture including the re-seeding step of the adventitious root after 2 weeks culturing.

6. A method for improving saponin content of adventitious root of ginseng, camphor ginseng and wild ginseng, when culturing ginseng, camphor ginseng and wild ginseng using tissue culture, the method comprises the steps of:

Pre-treating the adventitious root with any one of the growth regulators

such as BA(benzyl adenine), 2iP, zeatin, methyl jasmonic acid, TDZ, kinetin, jasmonic acid on the concentration of 1.0-100mg/L for 1-10 hours;

Obtaining the adventitious root by tissue culturing one of the ginseng, camphor ginseng and wild ginseng;

Seeding the adventitious root, which was pre-treated with growth regulators, on MS media containing 3% of sugar and 0.5-5.0mg/L of IBA or NAA and incubating it in a bioreactor which the temperature is 22-25°C and pH 6.0 under any one of the lights such as blue light, red light, fluorescent light; and

Harvesting the cultured adventitious root that was treated 10 days before harvest with 1.0-10.0mg/L of jasmonic acid or methyl jasmonic acid in a bioreactor for 7 days.

7. A method of culturing adventitious root of ginseng, camphor ginseng and wild ginseng by tissue, the method for improving the saponin content of adventitious root of ginseng, camphor ginseng and wild ginseng by tissue comprises the steps of:

Pre-treating the adventitious root with any one of the growth regulators such as BA, 2iP, zeatin, methyl jasmonic acid, TDZ, kinetin, jasmonic acid on the concentration of 1.0-100mg/L for 1-10 hours;

Obtaining the adventitious root by tissue culturing one of the ginseng, camphor ginseng and wild ginseng;

Seeding the adventitious root, which was pre-treated with growth regulators, on MS media containing 3% of sugar and 0.5-5.0mg/L of IBA or NAA and incubating it in a bioreactor which the temperature is 22-25°C and pH 6.0 under any one of the lights such as blue light, red light, fluorescent light; and

Harvesting the cultured adventitious root and treating it with 1.0-

10.0mg/L of jasmonic acid or methyl jasmonic acid for 7 days after washing it with tap water.

8. The method for improving saponin content of adventitious root of ginseng, camphor ginseng and wild ginseng, when culturing ginseng, camphor ginseng, wild ginseng using tissue culture of claim 6, the method for improving saponin content in the adventitious root of ginseng, camphor ginseng and wild ginseng by tissue culture including choosing any one of the balloon shape bioreactor or the conical shape bioreactor.

9. The method for improving saponin content of adventitious root of ginseng, camphor ginseng, wild ginseng, when culturing ginseng, camphor ginseng and wild ginseng using tissue culture of claim 6 or 7, the method for improving saponin content in the adventitious root of ginseng, camphor ginseng, wild ginseng by tissue culture including transferring to the media which was not added nitrogen for 5-10 days before the harvest of cultured adventitious root.